Evidence for the steady-state change in the plumbing system dynamics of the 2007-2018 CE activity of Stromboli volcano

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The Present-days steady-state activity of Stromboli has been characterised by persistent mild explosive eruptions, ejecting black scoria bombs, over the last several hundred years. Periodically, lava flows and paroxysms interrupt the "normal" activity. A degassed and highly porphyritic magma (*hp* magma), with a basaltic shoshonitic composition and a shallow level origin is erupted by the normal activity and lava flows, whereas a slightly more mafic and volatile-rich magma of deeper derivation and with low phenocryst content (*lp* magma) is also erupted as pumices by paroxysms. The *hp* magmas undergo crystallization together with rapid mixing with the periodic refreshing *lp* magmas, which only during paroxysms reaches the surface without mixing with *hp* magmas. During ascent, the *lp* magmas pass through an intermediate cumulate crystal-mush zone, recording the highly variable and high Sr-isotope signature of the previous magmas, and transport antecrysts/antemelts into the shallower reservoir. These processes are capable to maintain the shallow *hp* reservoir in steady-state conditions in which the fast system perturbations (paroxysms) caused by the refilling with fresh *lp* magmas are quickly recovered. Indeed, until 2009 CE activity, matrix glass compositions of *lp* and *hp* magmas were usually well distinct and their mixing was only evident from the descrease of Sr-isotopes of both *hp* and *lp* magmas with time, associated to specific micro-Sr isotope zoning of minerals.

The activity of period 2009-2018 CE, however, has erupted products with matrix glass compositions filling the gap between the typical *lp* and *hp* glass compositons and showing a well defined mixing trend. Moreover, from 2007 CE onwards, Sr-isotope ratios have reversed their variation starting to increase with time in both *lp* and *hp* magmas. Furthermore, in the 2017-2018 CE activity, the *lp* magmas, previously showing lower Sr-isotopes than *hp* melts, have similar Sr-isotopes to those of *hp* magmas. These results show a clear change in the steady-state of the Stromboli Present-days plumbing system possibly due to mantle source processes and/or to shallow interaction processes between *lp* magmas and the crystal-much zone.